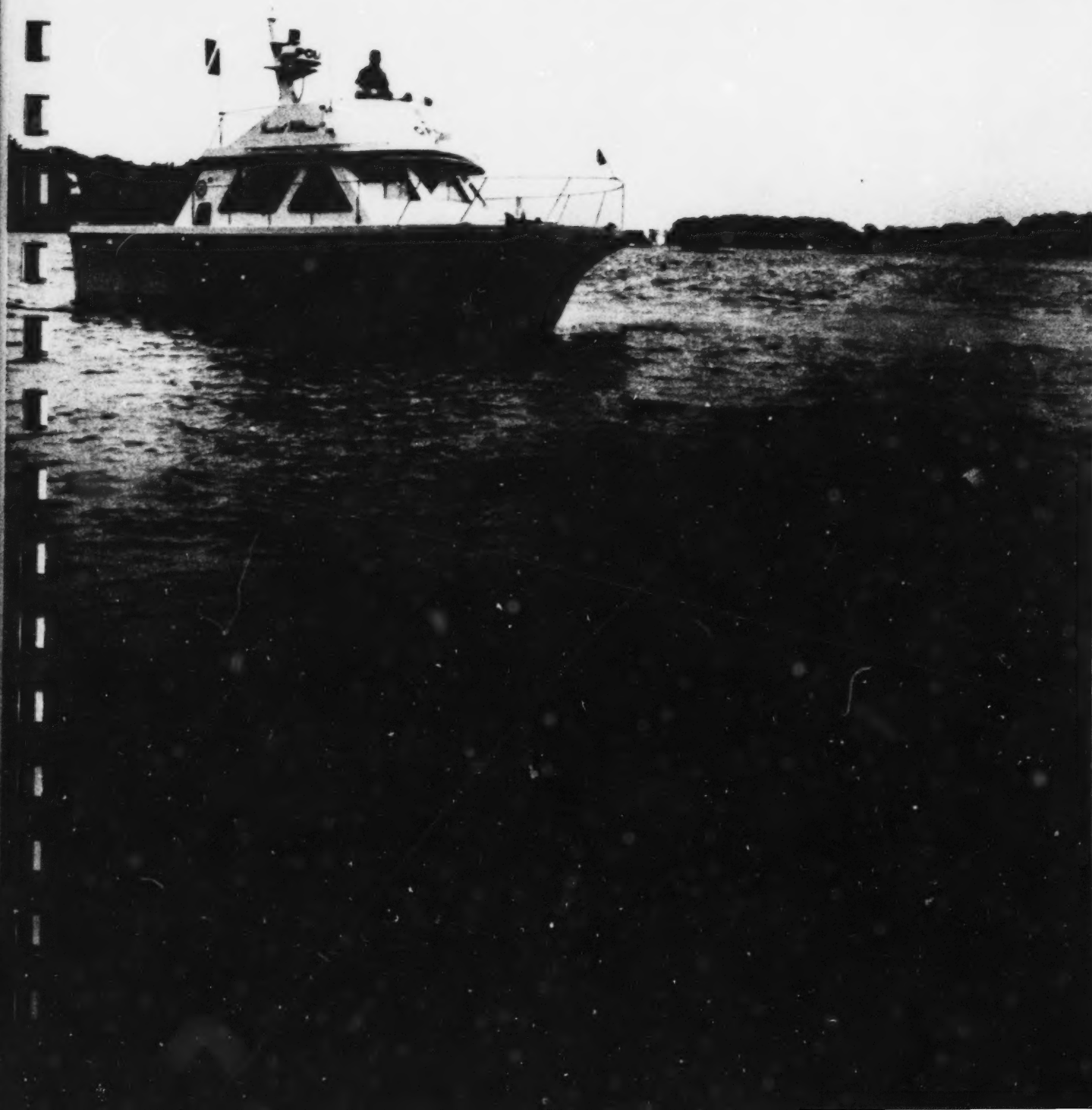


**An Analysis of
Boating Fatalities
in Ontario
1980-83**



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A supplementary appendix, *Boating Fatality Data for Ontario, 1980-83* is available on request for those individuals or organizations who wish to use the raw data for their own calculations.

FOREWORD

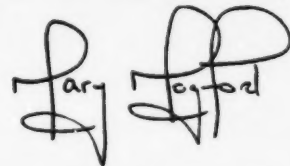
About 100 people die in boating accidents each year in Ontario.

This statistic was one of the reasons that the Ministry of Natural Resources created the Office of Recreational Boating in July of 1983. This study prepared by the Office of Recreational Boating, is based on an analysis of coroners' reports for recreational boating fatalities in Ontario from 1980 to 1983. The results show a large percentage of boating fatalities involve people in small boats, both powered and unpowered.

One of the government's responsibilities is to try to make the boating public aware of the need for safety training, and to persuade them to take one of the many boating courses offered by various boating organizations throughout the province.

The information in this study should help these organizations pinpoint the major causes of boating accidents so they can focus their courses accordingly.

I believe that this report is a positive step toward a new era of boating safety training in Ontario.

A handwritten signature in black ink, appearing to read 'Mary Mogford', with a stylized, cursive script.

Mary Mogford
Deputy Minister

EXECUTIVE SUMMARY

Concern has been expressed by private-sector boating organizations about the number of fatalities related to boating. In an effort to identify the causes of these fatalities, the Ontario Ministry of Natural Resources' Office of Recreational Boating, in co-operation with the Provincial Chief Coroner's office and the Red Cross, carried out an analysis of four years of boating fatalities from 1980-83 inclusive. This report provides a demographic profile of the type of boater most frequently involved in fatalities and the most common contributing factors. From these findings, the Ministry of Natural Resources can determine how to work effectively with boating organizations in order to prevent fatalities.

During the four year period under study, the total annual fatalities ranged from 68 to 123. The most meaningful way to measure the fatality rate is as a proportion of the total number of boating occasions, an occasion being any boating participation lasting more than fifteen minutes by one person in one day. It was estimated that an annual average of two fatalities occurred for each one million boating occasions. Although it is probable that males go boating more frequently than females, analysis shows a remarkably high percentage of males involved in fatalities (94 percent). The primary cause of death in boating fatalities was drowning (70 percent). Hypothermia-related fatalities occurred throughout the year, but more than half (52 percent) of these occurred outside of the peak boating season which is from May to August. If the low participation rate during the spring and fall is taken into account, the incidence of fatalities is unusually high. It is during the cold water months that boating activities are potentially more dangerous.

In terms of absolute numbers, the largest group of fatalities (44 percent) involved powered boats less than 5.5 metres (18 feet) in length. Canoes also accounted for a substantial proportion (28 percent). When the fatality rate for specified boating groups was estimated, however, the highest rate was found among non-powered vessels (excluding canoes and sailboats) such as car-toppers rowboats and dinghies.

The most common types of accidents preceeding boating fatalities were capsizing (38 percent - usually in canoes and rowboats) and falling overboard (28 percent - primarily in rowboats and powered boats 5. 5m (18 ft) or less in length).

The following age groups had the highest percentage of fatalities: 20-24 with 15. 6 percent; 25-29 with 13. 9 percent; and 15-19 with 12. 3 percent.

Two factors appear to have contributed most frequently to fatalities: the absence of a lifejacket/PFD(personal floatation device) and alcohol/drug abuse. These were contributing factors in 82 percent and 42 percent of fatalities respectively. Among victims known to be fishing, 91 percent were not wearing a lifejacket/PFD. The highest percentage (68 percent) of alcohol/drug-related fatalities occurred in the 35-39 age category.

In summary, the profile of boaters most frequently involved in fatalities were young males who were boating in a small vessel, were not wearing lifejackets, and were likely to have been drinking. Their entries into the water were caused either by their falling overboard or by the boat capsizing.



Section 1: Annual Boating Fatalities in Relation to Boating Participation and Occasion Rates

Figure 1 portrays the total fatalities for the years 1969-83. Totals range from 123 in 1980 to 68 in 1983, with an average of 96 fatalities per year. There is no evidence of a significant trend in the number of boating fatalities for 15 years surveyed.

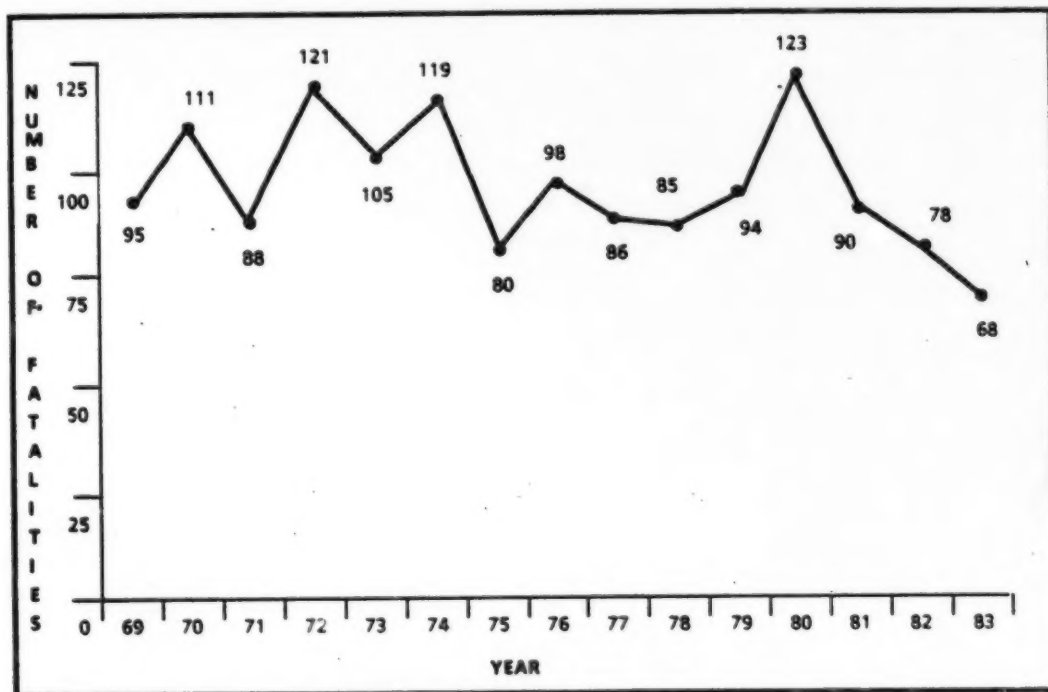


Figure 1: Total Boating Fatalities for the Years 1969 to 1983 Inclusive

Over the four years (1980-83) considered in this report, the number of boating fatalities has decreased annually. It would be tempting to assume that this decrease is due to an increase in the public's boating safety awareness. It is more likely, however, that the number of fatalities was influenced by factors such as the weather, economic conditions, population growth and tourism. Changes in any of these factors would influence the level of boating participation.

This study made several assumptions to calculate the rate of Ontario boater participation and annual boating occasions, in order to extrapolate data for the period under review. Appendix 4 describes the methods used to estimate the participation rates and occasion rates. Calculations were based primarily on data from the Ontario Recreation Supply Inventory (ORSI), which defines participation rate as the number of respondents participating at least once in a given recreational activity in the preceding year.

Figures 2 and 3 show the annual number of participants and boating occasions by Ontarians (including U.S. entrants), by type of boat. A boating occasion is defined by the ORSI (1977) as one person participating in one activity for a period of time greater than fifteen minutes during one day. In 1983 Ontario had approximately 5,347,000 participants in Ontario's boating activities. Combined statistics from 1980-83, show the rates of participation are 50 percent for powerboating and 22 percent for canoeing. Total annual boating occasions for 1983 were estimated at 48,030,000.

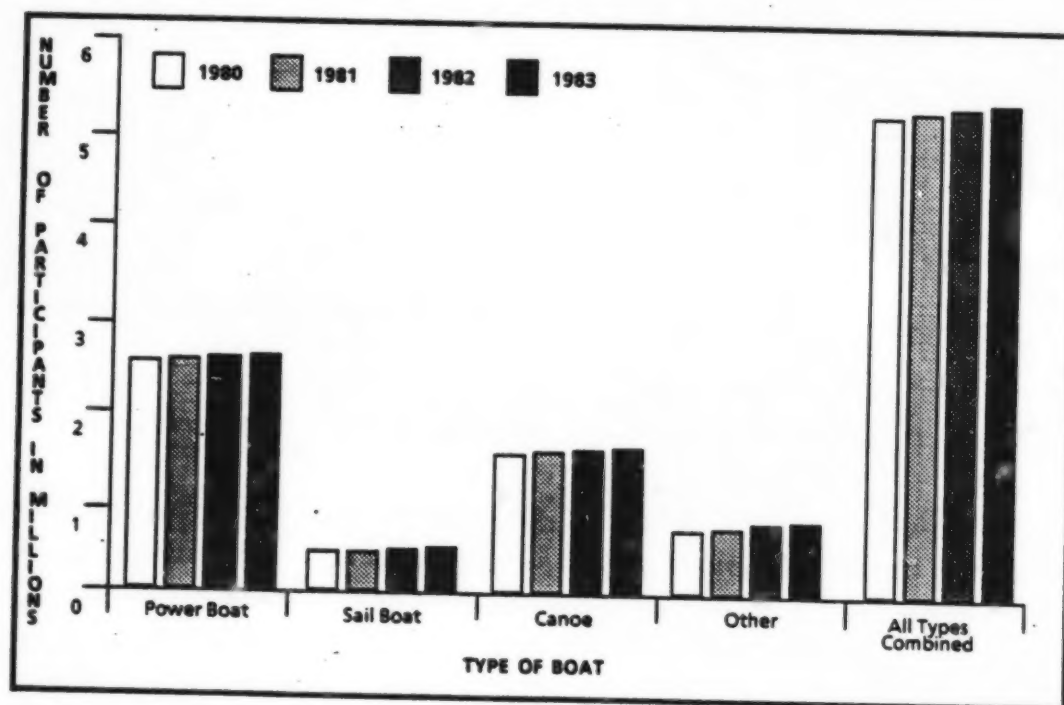


Figure 2: Annual Participation in Recreational Boating in Ontario (Including U. S. Entrants) by Boat Type, 1980-83

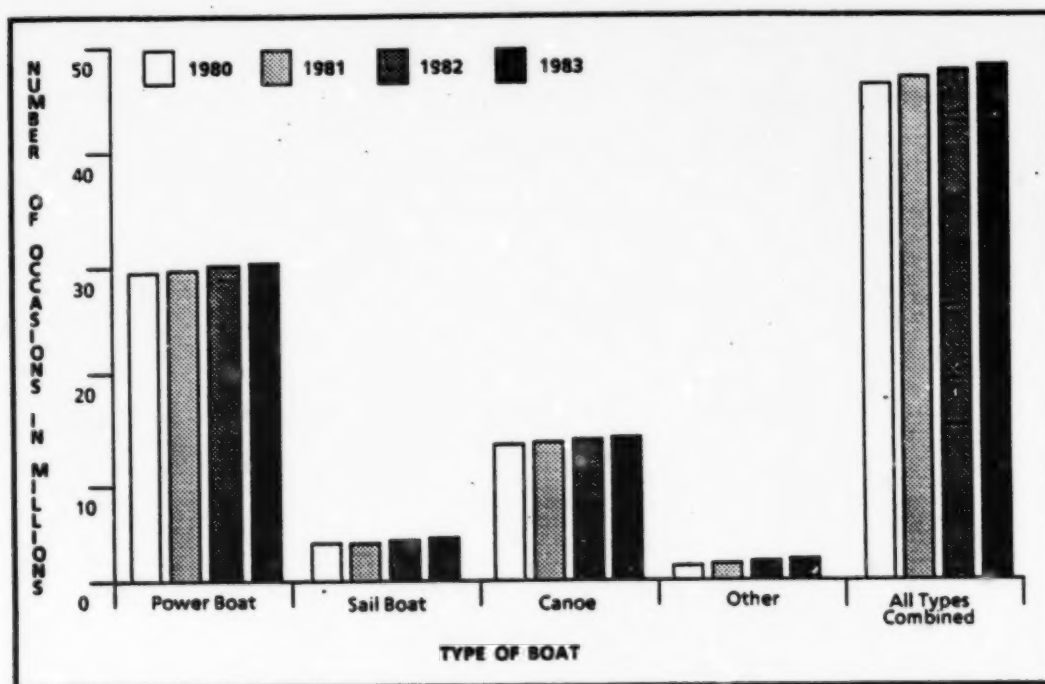


Figure 3: Annual Boating Occasions in Ontario (Including U. S. Entrants), by Boat Type, 1980-83

For Ontario residents, the calculation of total occasions by boat type was based on the annual number of occasions per participant: 10.9 for powerboats, 8.1 for canoes, 7.1 for sailboats and 0.3 for other boats (ORSI unpublished data). The category Other includes non-powered vessels such as rowboats, rafts, dinghies and unknowns (canoes and sailboats are not included). Because the participation rate for the powerboating category is higher than for canoes, sailboats and other boats, the annual number of powerboating occasions is also much higher (63 percent of the total annual boating occasions).

Figures 4 and 5 depict the fatality rate by boat type for each 100,000 participants and 1 million occasions respectively. In general, the fatalities per participant (Figure 4) follow the downward trend of the fatality totals for 1980-83.

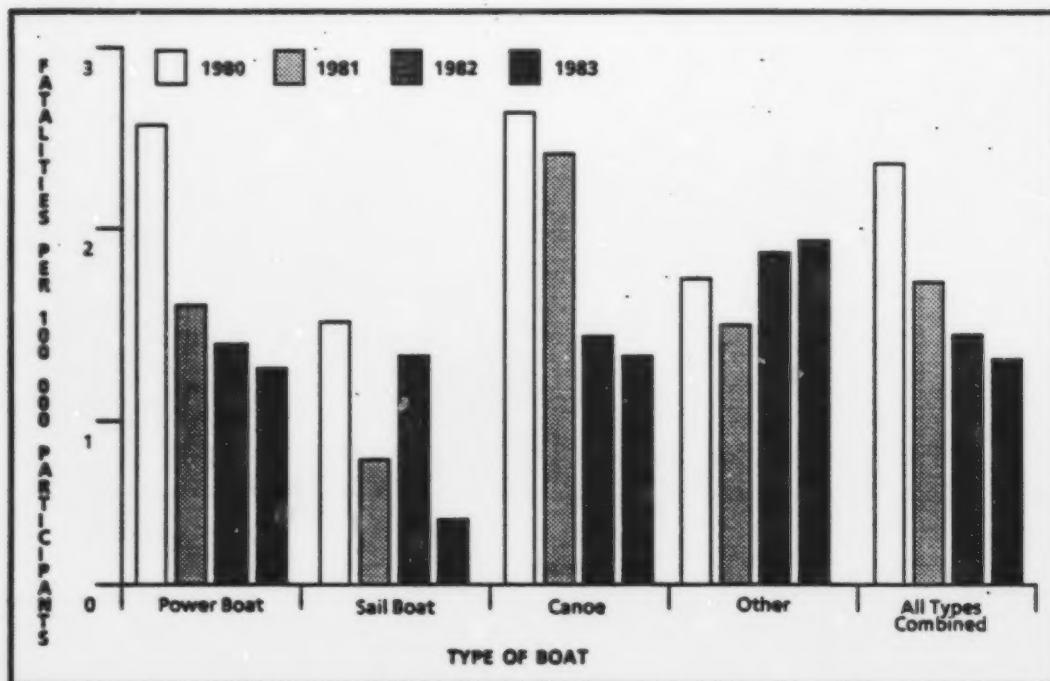


Figure 4: Fatalities by Boat Type (Including Combined Types) per 100,000 Participants 1980-83

Again, this trend may be a result of any of the four main factors that affect boater participation. In Figure 5, Other boats (non-powered vessels such as rowboats, rafts, dinghies and unknowns) represent two percent of the total occasions, which is the lowest proportion of boating occasions (see Figure 3). It is evident, however, that the rate of fatalities within this category is comparatively much higher. The fatality per occasion rate ranges from 11.5 to 15.5 for other boats, compared to an overall fatality per occasion rate of 1.4 to 2.6 for combined boat types. Caution should be exercised when considering the high rate of fatalities in the Other boats category, as the sample size was considerably smaller than that for the power, sail or canoe categories.

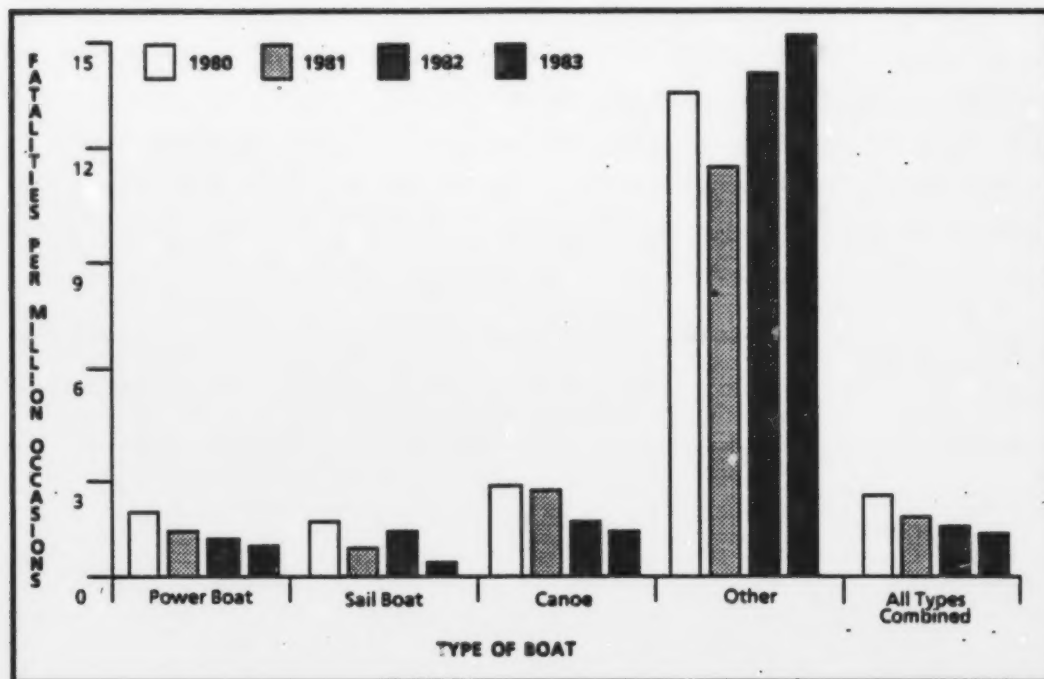


Figure 5: Fatalities by Boat Type (Including Combined Types) per Million Boating Occasions 1980-83

Section 2: Boating Fatalities by Type of Boat

As was pointed out in Section 1, a comparison of the numbers of fatalities for each category of boat does not present as true a picture as a comparison of the rates of fatalities in each category, based on boating occasions. Unfortunately, data are available only for the broad categories of powerboat, sailboat, canoe and other. A comparison between the number of fatalities and the number of occasions by type of boat is shown in the following table.

Type of Boat	Total Fatalities %	Total Occasions %	Fatality Rate/ Million Occasions
Powerboats 5.5m (18 ft) or less	44	N/A	N/A
Powerboats more than 5.5m (18 ft)	5	N/A	N/A
Powerboats Combined	49	59	1.9
Canoes	29	28	2.2
Sailboats	6	11	1.2
Other	16	3	13.6
N/A denotes data not available			

Although the highest absolute number of fatalities occur with powerboats, the highest fatality rate is found in the Other boats category.

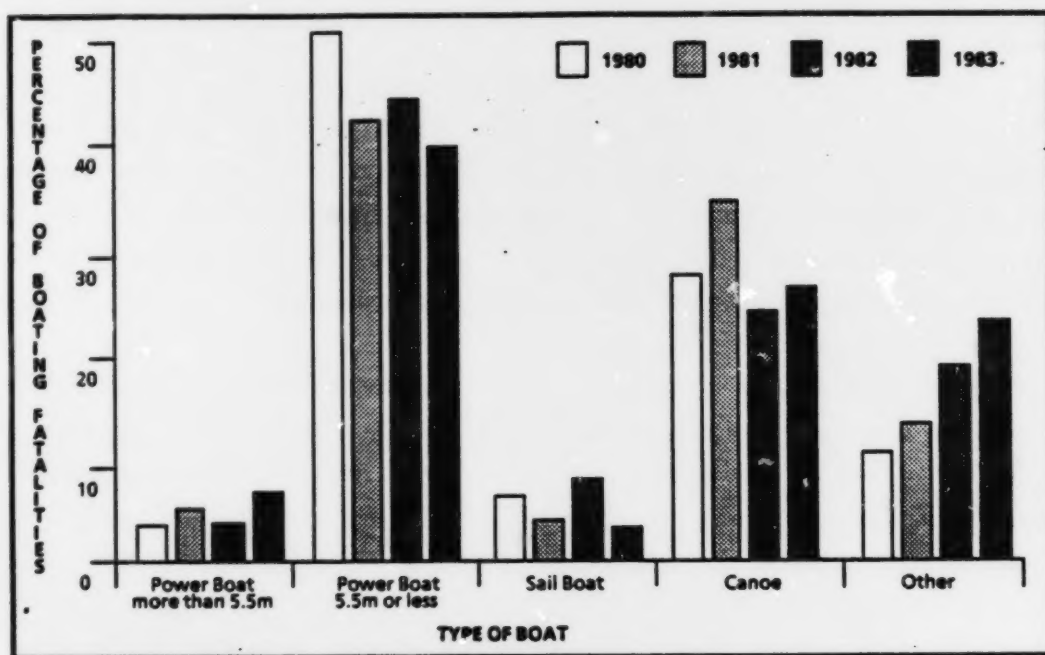


Figure 6A:..Percentage of Fatalities by Boat Type 1980-83

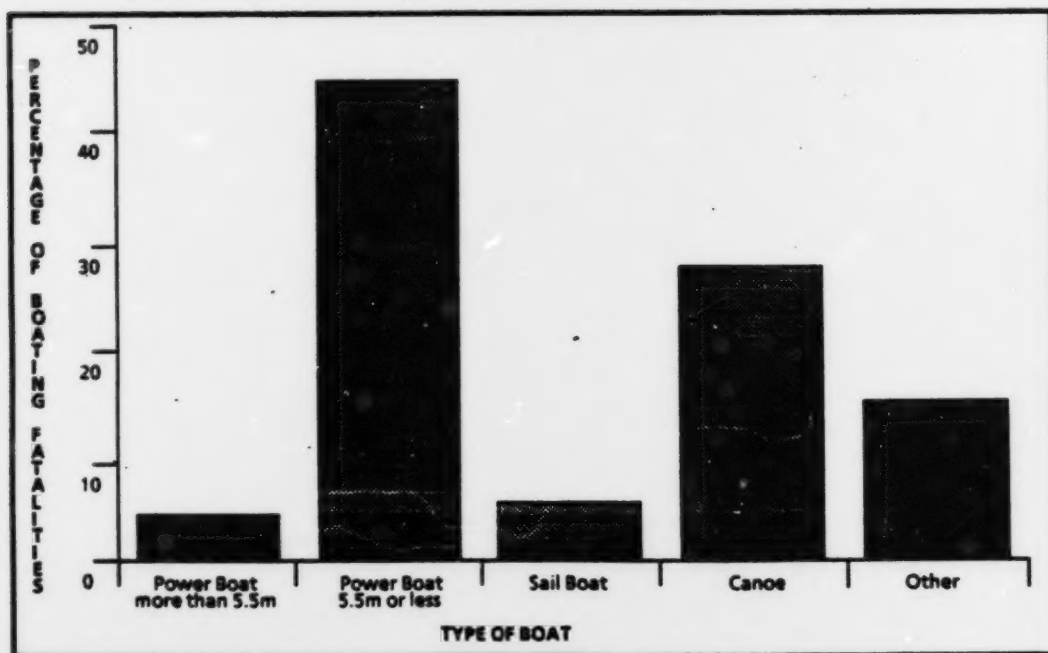


Figure 6B:..Percentage of Fatalities by Boat Type, Combined Years 1980-83

Section 3: Boating Fatalities by Month

Figures 7A and 7B present the percentage of boating fatalities by month for 1980-83. May, June, July and August accounted for 68.6 percent of the boating fatalities. This figure is not unusual because these months are generally considered to be the boating season and therefore can be expected to have a considerably higher number of boating occasions.

One anomaly, however, is the peak in fatalities in May. Weather conditions in particular may have been an influencing factor. The water is still very cold in May and many of the fatalities that occurred involved hypothermia (48 percent). A comparison of the number of fatalities per occasion by month would be of interest in this case, but unfortunately the data are not available.

It is very probable that there are fewer boating occasions in May than in June, July or August, making the fatality rate per occasion higher in May. In addition, the survival rate for each accident in May would likely be lower, since the water is colder.

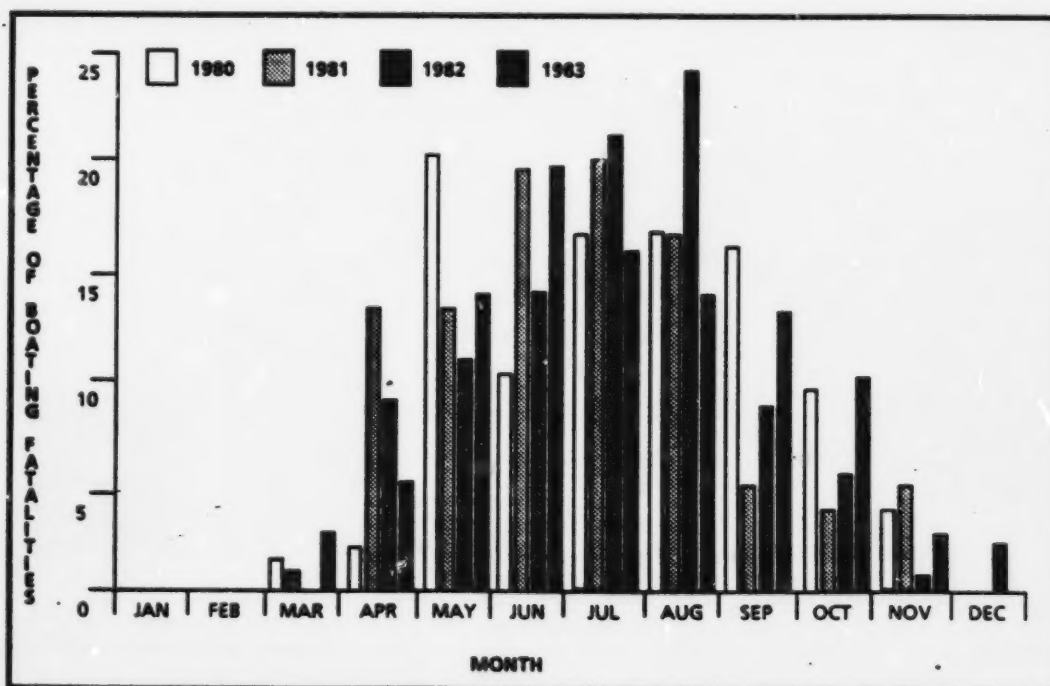


Figure 7A: Percentage of Fatalities by Month 1980-83

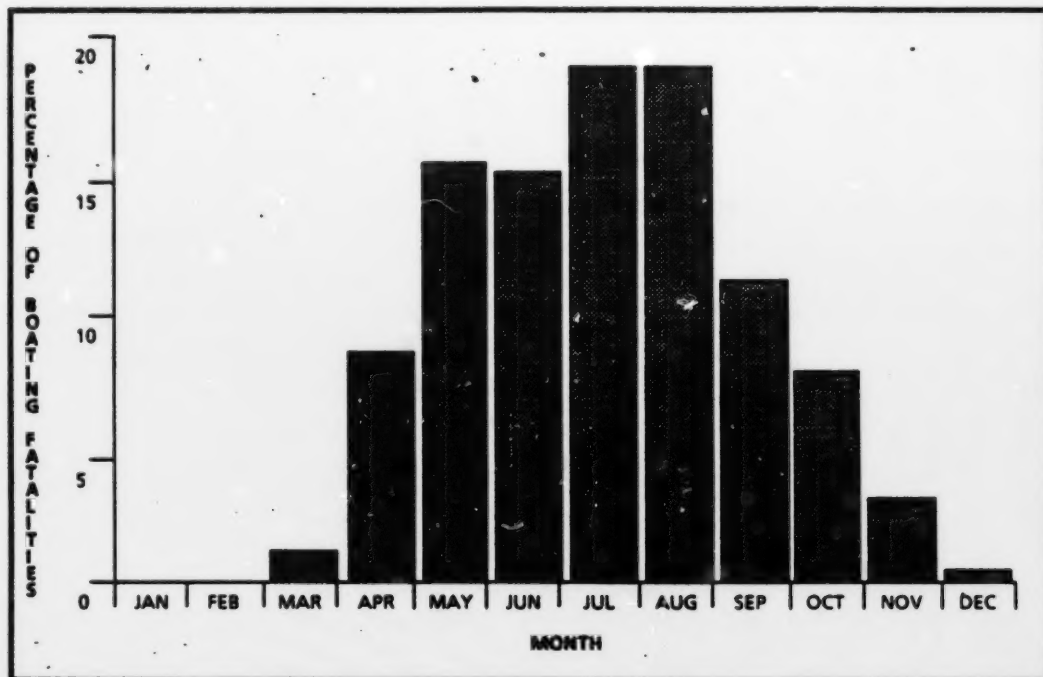


Figure 7B: Percentage of Fatalities by Month, Combined Years 1980-83

Section 4: Boating Fatalities by Age Group and Sex

Figures 8A and 8B depict boating fatalities by age group. The age range of 10 - 49 years accounts for 75.2 percent of all boating fatalities. The highest number of fatalities are found in the 20-24 and 25-29 age groups, which account for more than one quarter (29 percent) of all boating fatalities. Data on participation rates and boating occasions by age group are not available.

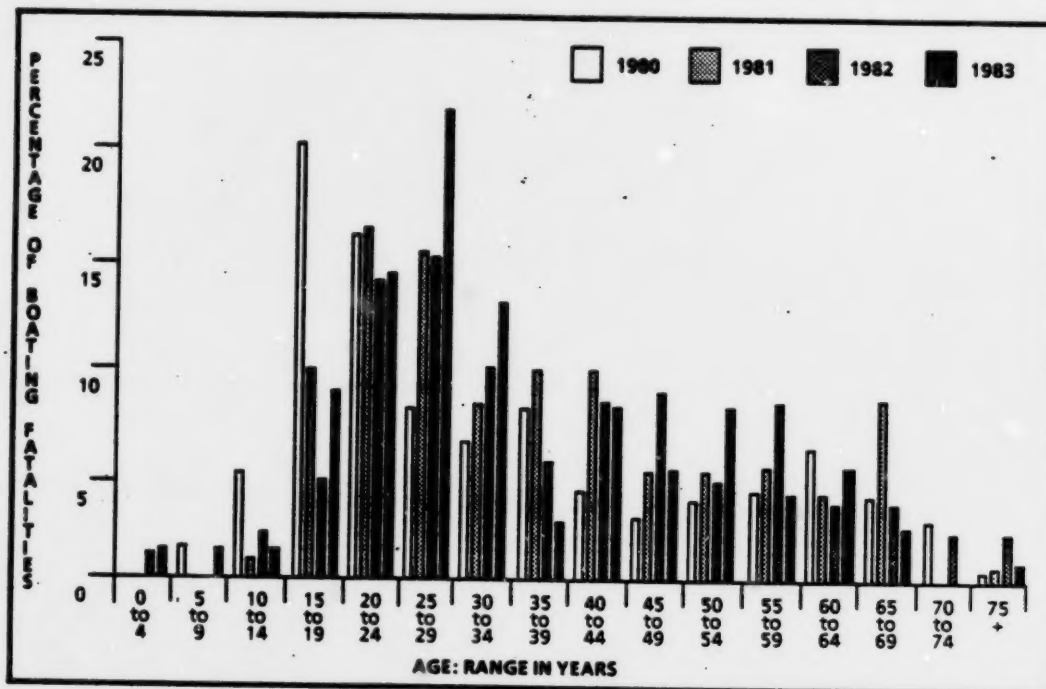


Figure 8A: Percentage of Fatalities by Age Group 1980-83

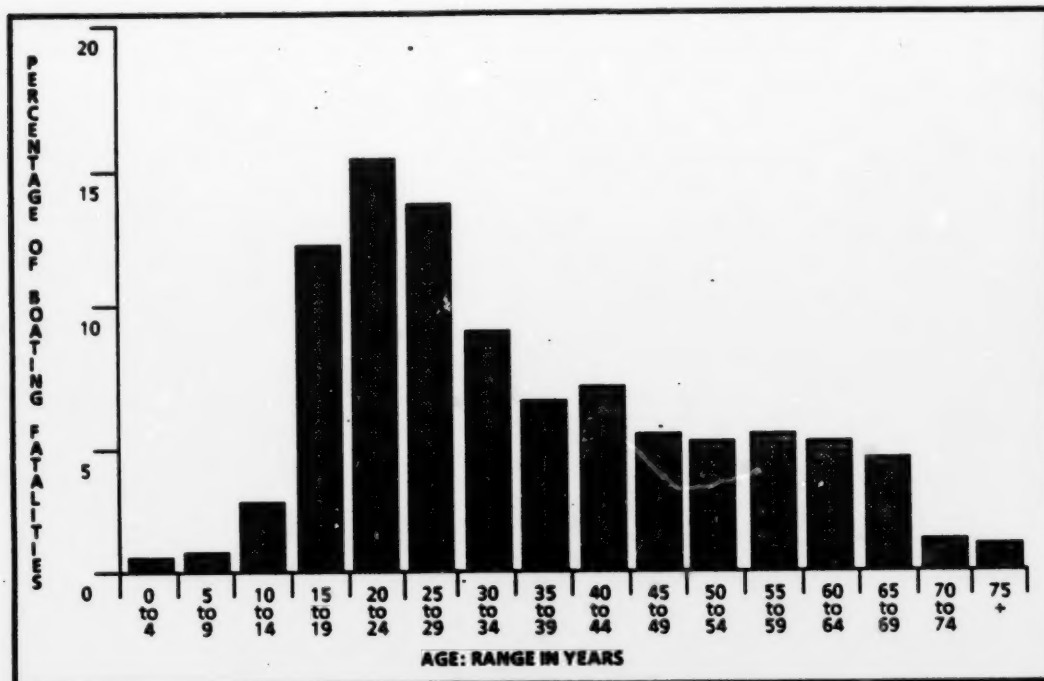


Figure 8B: Percentage of Fatalities by Age Group, Combined Years 1980-83

A comparison of the number of males and females involved in boating fatalities reveals a remarkably high percentage of males - 94 percent in 1980-83. The 1977 ORSI survey found a male-to-female ratio of 56 - 44 percent for individuals who go boating at least once a year. Even though it is likely that males who participate in boating do so more frequently than females, the data seem to indicate that male fatalities are disproportionately high.

Section 5: Boating Fatalities by Cause of Death

Figures 9A and 9B present the boating fatality statistics by cause of death. The two most common causes of death in boating accidents in 1980-83 were drowning (70 percent) and hypothermia/drowning (16 percent).

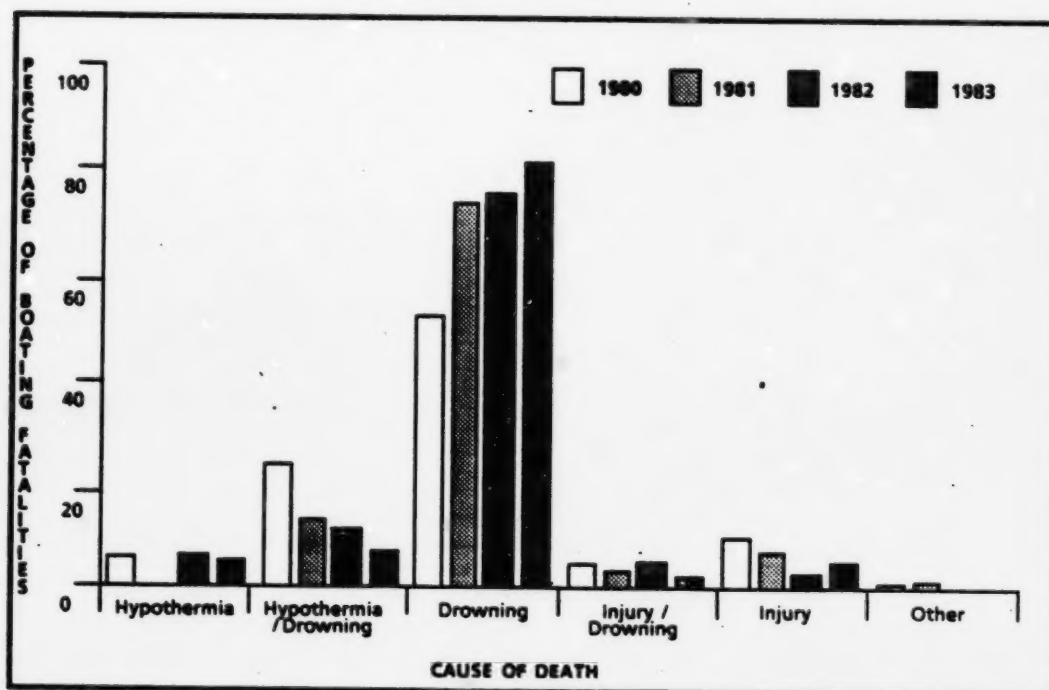


Figure 9A: Percentage of Fatalities by Cause of Death 1980-83

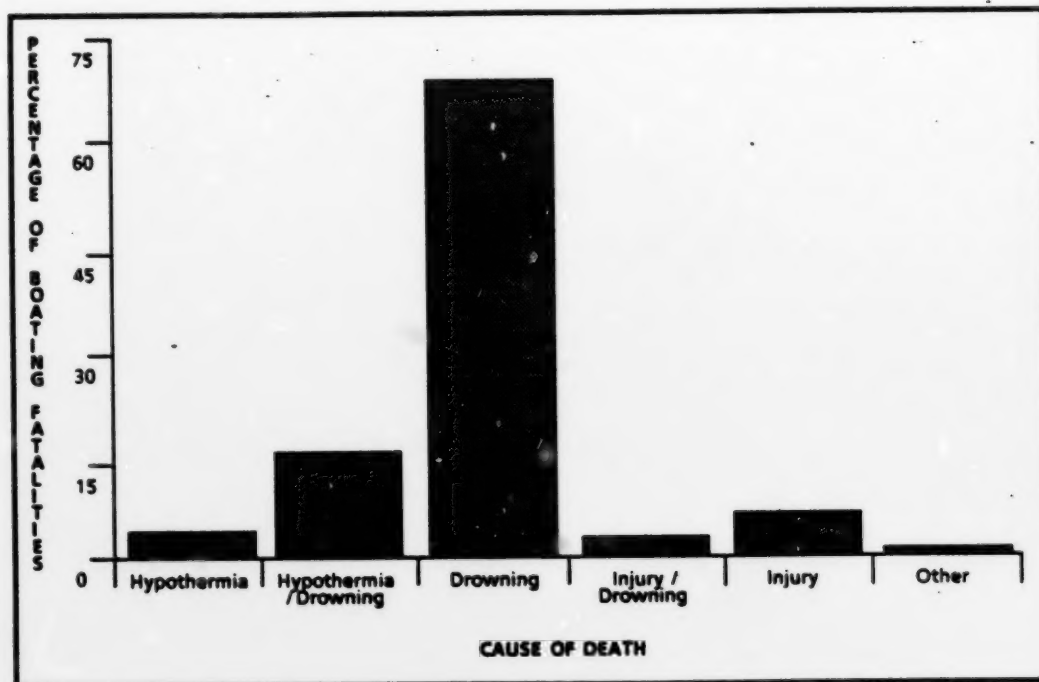


Figure 9B: Percentage of Fatalities by Cause of Death, Combined Years 1980-83

Although the cause of hypothermia is usually considered to be exposure to extremely cold water, prolonged exposure to water of a comfortable temperature can have an equally detrimental effect. As long as the water is at a lower temperature than that of the body, heat loss is experienced.

Figure 9C shows the fatalities caused by hypothermia and hypothermia/drowning by month for 1980-83. During the summer months deaths involving hypothermia were still evident. Unfortunately, coroner's reports do not distinguish between deaths caused by hypothermia alone and those caused by a combination of hypothermia and drowning (see Appendix 2). When the number of hypothermia and hypothermia/drowning fatalities were combined, it was found that 47 percent of the fatalities occurred outside of the peak boating season (May - August). Hence, if the low participation rate outside of this season is considered, the rate of fatalities from hypothermia for the September - April period was probably quite high.

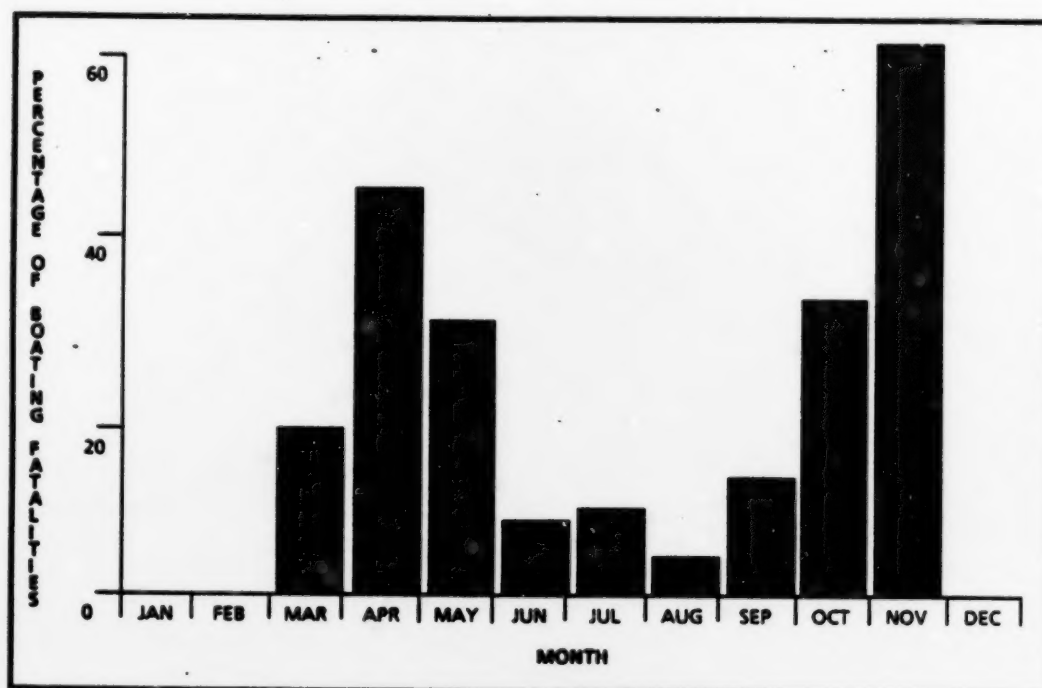


**Figure 9C: Percentage of Fatalities from Hypothermia and Hypothermia/
Drowning, by Month Combined Years 1980-83**

Section 6: Boating Fatalities by Type of Accident

The type of accident that preceded most boating fatalities from 1980 to 1983 was capsizing (38 percent). Falling overboard was also responsible for a substantial number of fatalities (27 percent). Figures 10A and 10B show boating fatalities by type of accident.

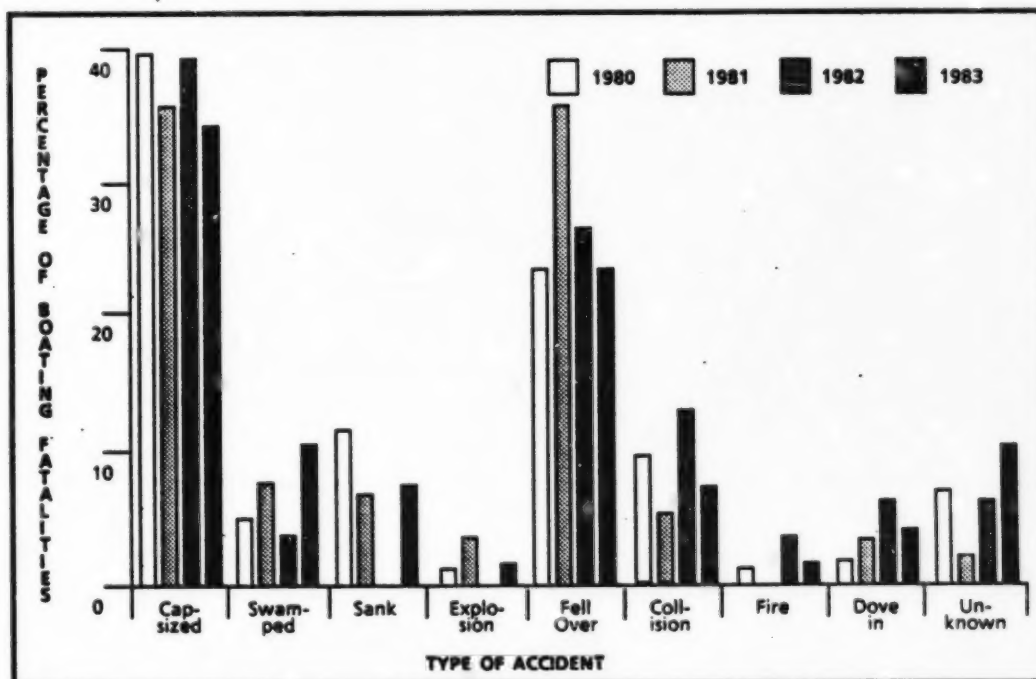


Figure 10A: Percentage of Fatalities by Type of Accident 1980-83

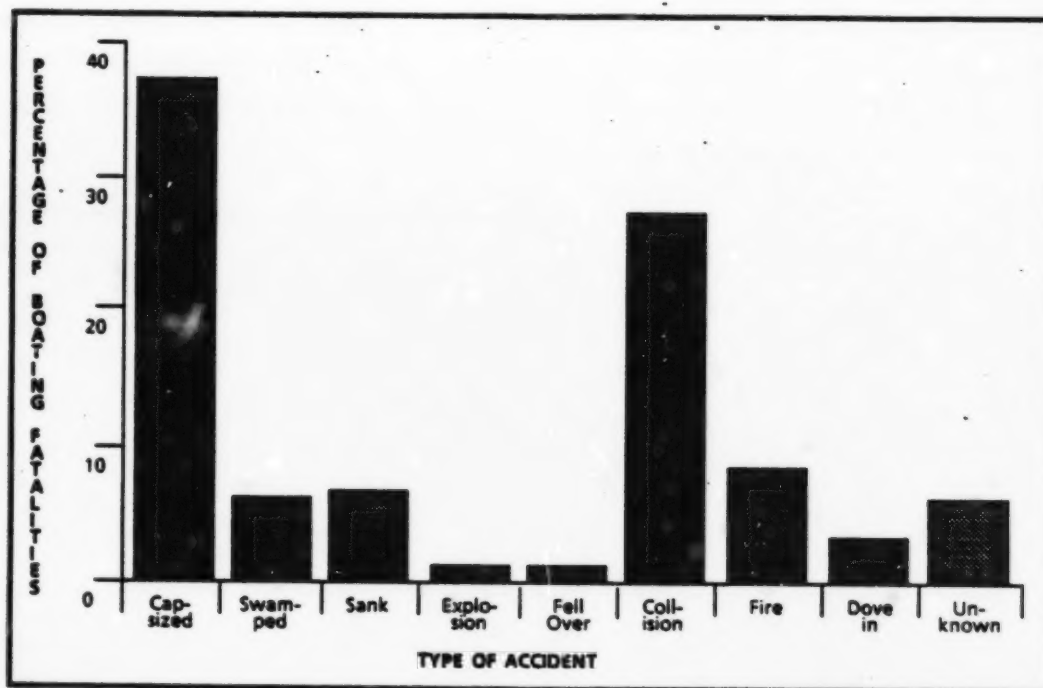


Figure 108: Percentage of Fatalities by Type of Accident, Combined Years 1980-83

It is interesting to note that three percent of the fatalities resulted from instances in which the victim entered the water intentionally i.e., dove in. The following table shows the two most common types of accident for five categories of boat.

Type of Boat	Type of Accident	Frequency of Occurrence (%)
Powered boats 5.5m (18ft) or less	Collision	29
	Fell Overboard	24
Powered boats more than 5.5m (18ft)	Fell Overboard	36
	Capsized	23
Canoes	Capsized	61
	Fell Overboard	17
Sailboats	Capsized	38
	Fell Overboard	24
Other	Capsized	39
	Fell Overboard	28

A more detailed picture is provided in figure 11, which illustrates the percentage of fatalities by boat type for the various categories of accidents.

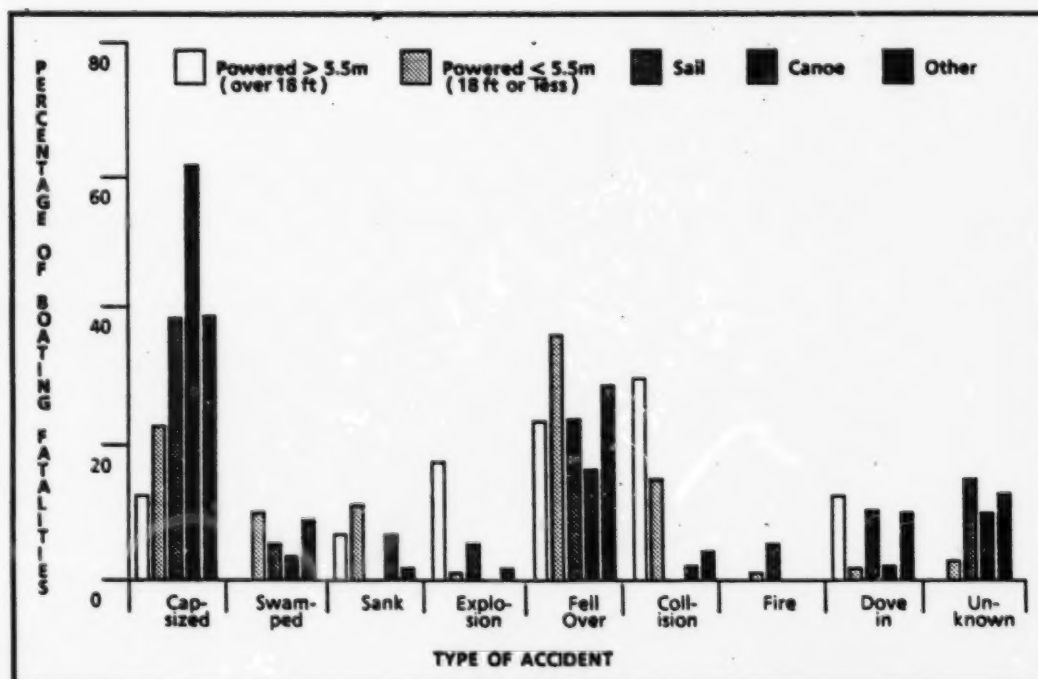


Figure 11: Percentage of Fatalities by Type of Accident and Boat Type, Combined Years 1980-83

Section 7: Boating Fatalities by Contributing Factors

The coroner's report generally describes the circumstances surrounding a death, thereby indicating the contributing factors. Analysis of the factors contributing to boating fatalities helps reveal the practices that should be addressed in a boating safety program. Figures 12A and 12B present the contributing factors for all types of boats combined. During the four years under study 82 percent of the victims were not wearing lifejackets/PFD's or did not have access to them.

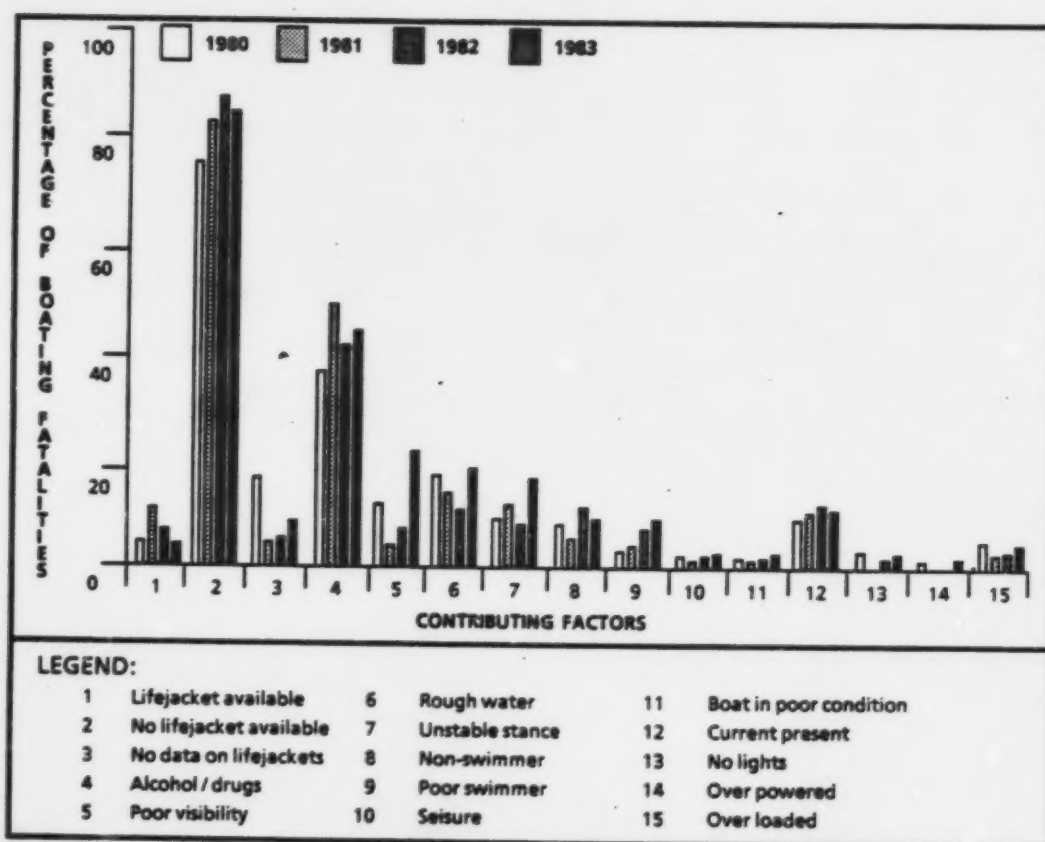


Figure 12A: Percentage of Fatalities by Contributing Factors 1980-83

A large percentage (42 percent) of the boating victims were found to be using alcohol and/or drugs. Although some had consumed only a small amount, the majority (74 percent) of those who drank were legally intoxicated. Legal intoxication is described as a blood-alcohol level greater than 0.08 mg of alcohol per 100 ml of blood; (see Appendix 3).

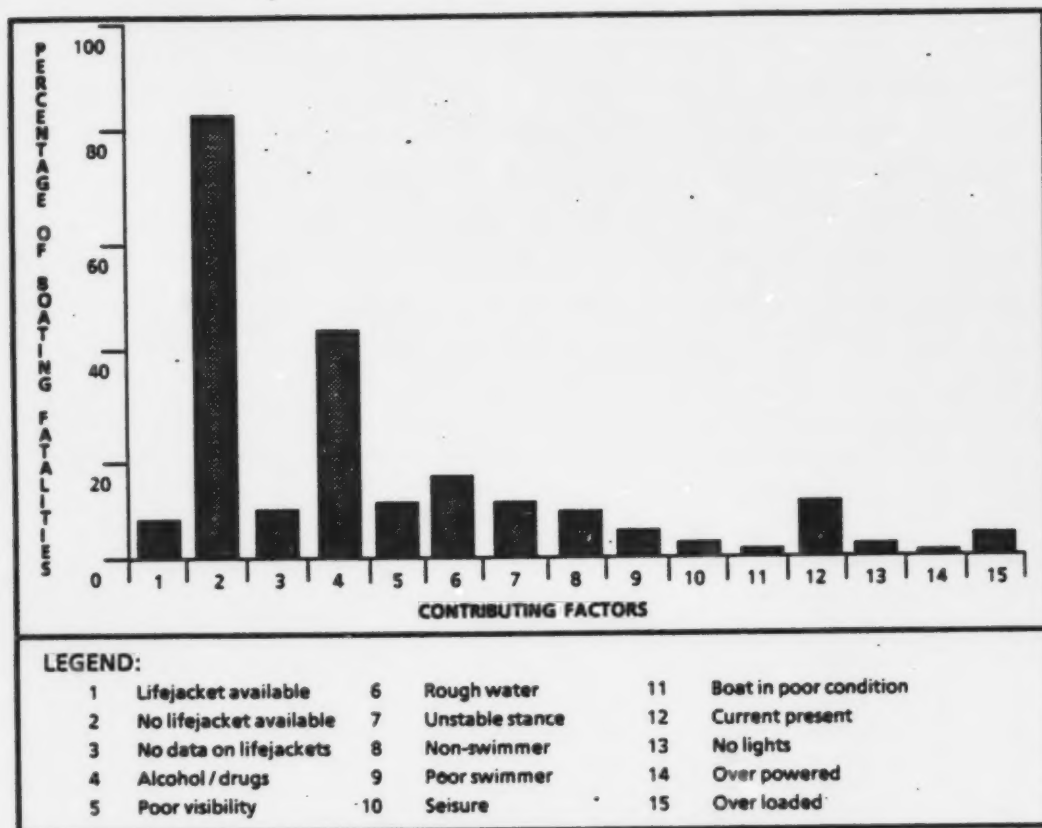


Figure 12B: Percentage of Fatalities by Contributing Factors 1980-83
Combined

Poor weather conditions and boating at night were two factors that frequently contributed to boating accidents. These two factors contributed to 30 percent of all boating fatalities in the four years surveyed: poor visibility due to weather and/or darkness, 12 percent and rough water, 18 percent. Poor weight distribution within a boat, leading to instability, contributed to those falling overboard or capsizing (12 percent of total fatalities).

It is suspected that overpowering of powerboats and overloading also are related to boating accidents. Unfortunately, information on the weight of the load or the horsepower capacity of the boat was unavailable, so that it was impossible to ascertain the relative importance of these two factors.

The percentage of fatalities for each contributing factor by type of boat are shown in Figure 13. For every type of boat the absence of a lifejacket or PFD was the single greatest contributing factor; alcohol/drug use was usually the second greatest factor. It is interesting to see that sailboats were often navigating rough waters at the time of the fatalities (43 percent). Some form of current often contributed to canoe fatalities (18 percent), and approximately 23 percent of the victims of fatalities in the other boat category were in an unstable position in the boat. In many of these cases, a non-swimmer was aboard who entered the water when someone rocked the vessel.

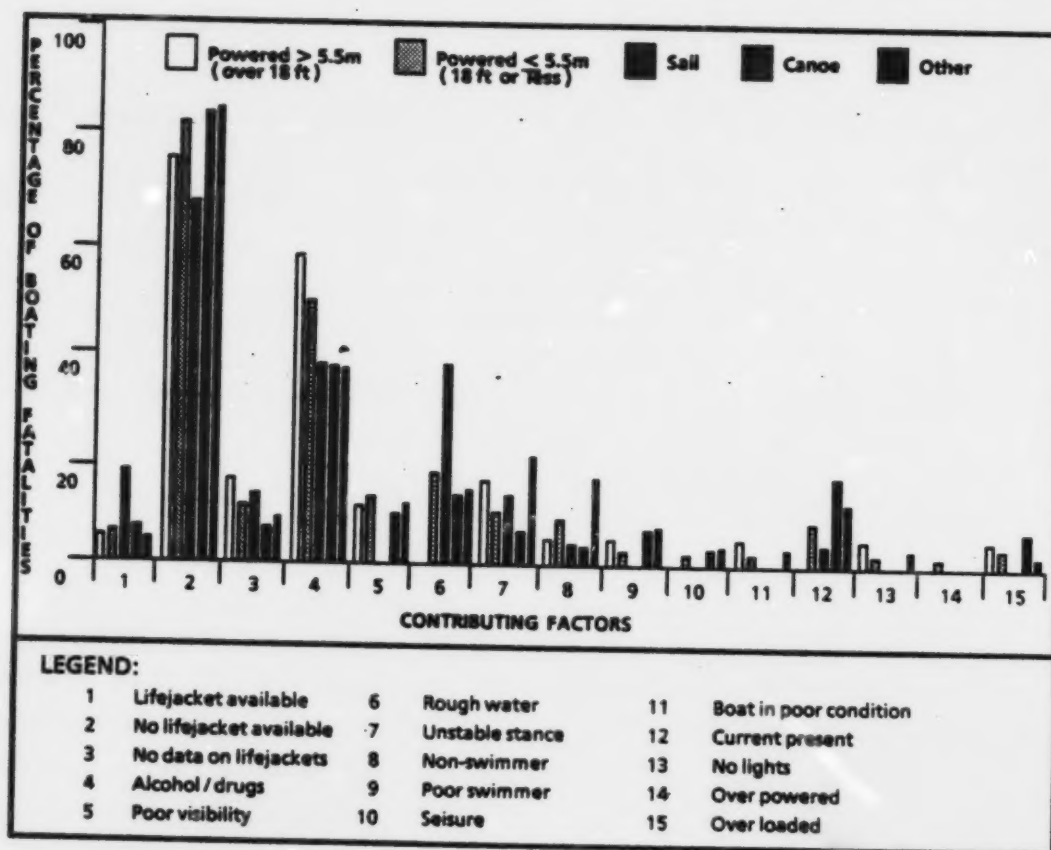


Figure 13: Percentage of Fatalities by Contributing Factors, and Boat Type, Combined Years 1980-83

Section 8: Boating Fatalities by Purpose of Trip

Figure 14 depicts the proportion of boating fatalities by the purpose of the expedition. In most cases (56 percent) the purpose of the trip was unknown but was likely to have been fishing and/or pleasure boating. These cases are represented by the other/unknown category. The next highest proportion of fatalities (33 percent) occurred in the group known to have been fishing, followed by hunting (6 percent) and transportation (5 percent).

If data on the annual number of fishing occasions (from a boat) were available, a fatality rate for the fishing group could be calculated. Approximately 91 percent of the victims in this group were not wearing lifejackets or PFDs. This figure is nine percent higher than the percentage of all fatalities not wearing lifejackets or PFDs.

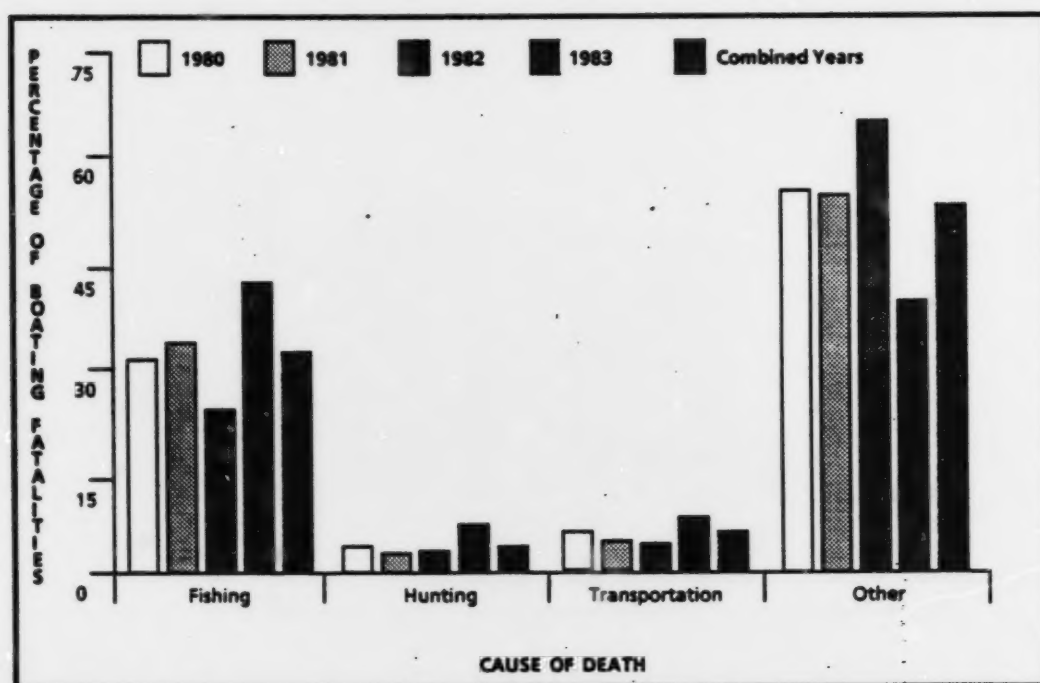


Figure 14: Percentage of Fatalities by Purpose of Trip, 1980-83 and Combined Years

Section 9: Analysis of Boating Fatalities Related to Alcohol/Drug Use

9.1 Fatalities by Age Group

Figures 15A and 15B depict alcohol/drug-related fatalities within various age groups. The total number of fatalities involving alcohol or drugs for an age group was divided by the total fatalities within that group. The highest proportion of fatalities involving alcohol /drugs occurred within the 35 - 39 year old age group (68 percent). Similarly, a range of 52 percent to 53 percent was found for age groups 15 - 19 and 20 - 24. Of the fatalities involving alcohol/drugs, 74.5 percent of the victims were legally impaired.

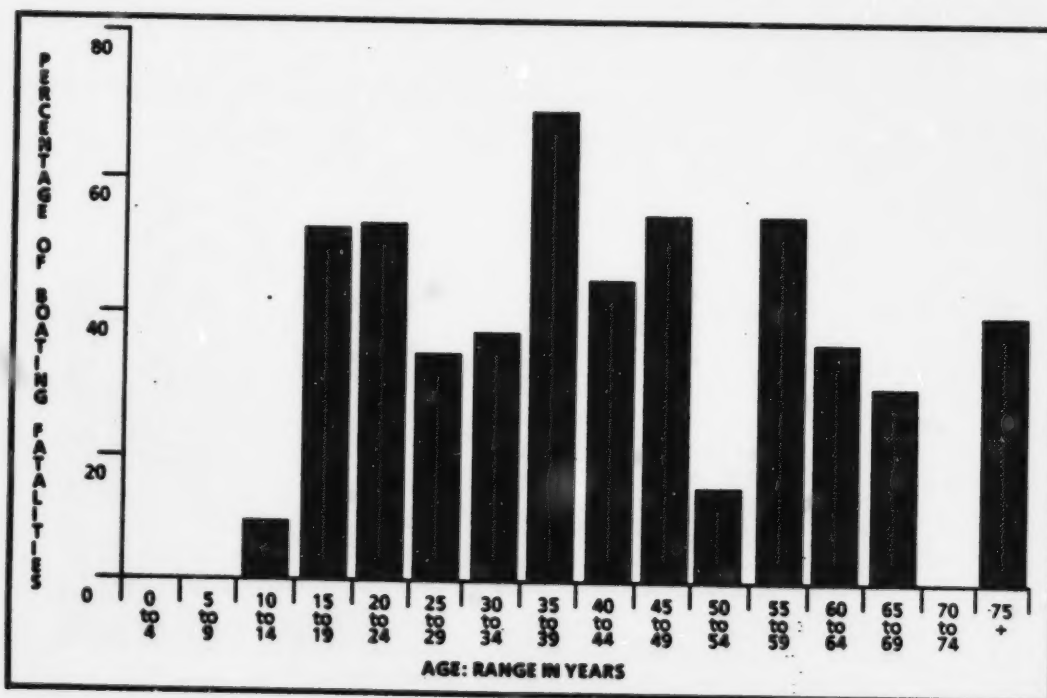


Figure 15A: Percentage of Fatalities Involving Alcohol/Drugs by Age Group, Combined Years 1980-83

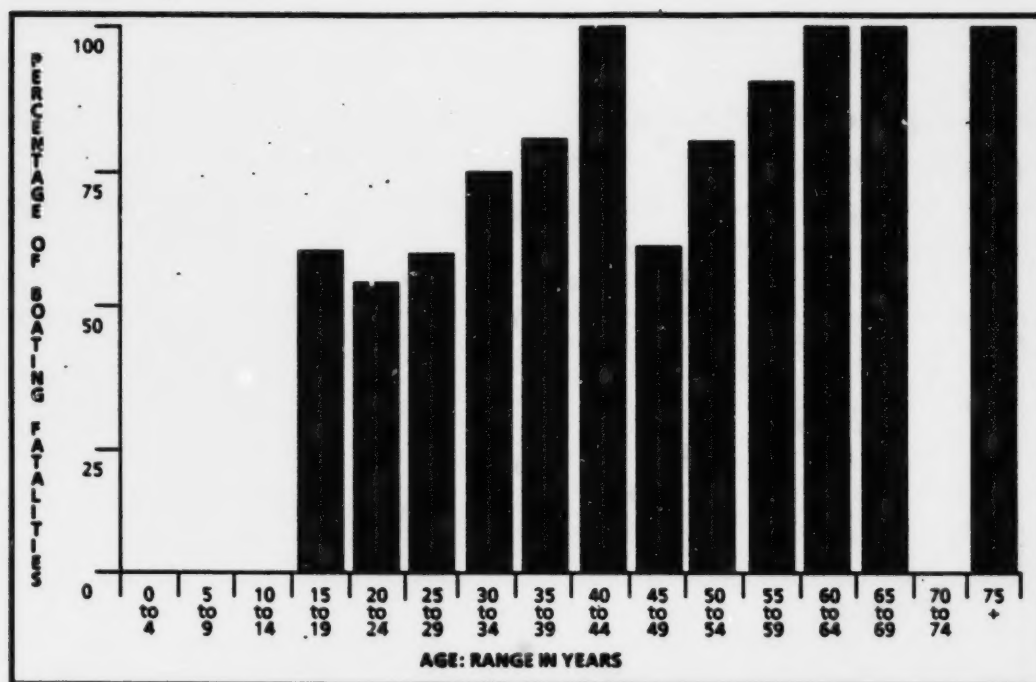


Figure 15B: Percentage of Fatalities Involving Alcohol/Drugs and Legal Impairment, Combined Years 1980-83

9.2 Fatalities by Boat Type

Fatalities involving alcohol or drugs accounted for 53 percent of all fatalities in powerboats 5.5m (18 ft) or less in length, compared with five percent for larger boats. For non-powered boats, alcohol/drug-related fatalities ranged from 33 percent to 38.6 percent.

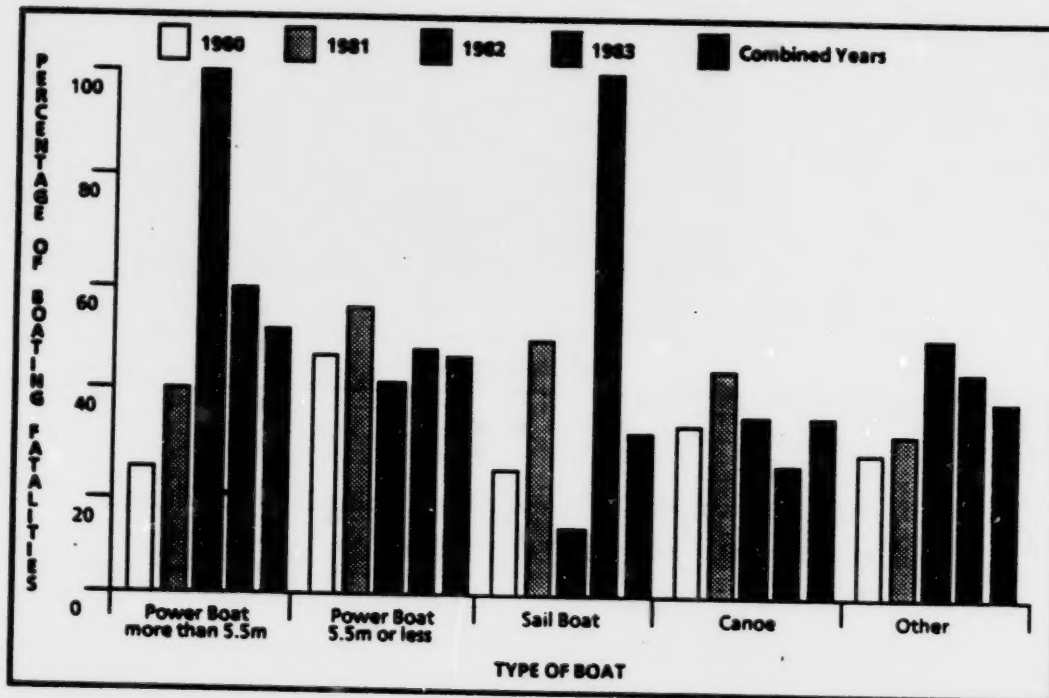


Figure 16: Percentage of Fatalities Involving Alcohol/Drugs by Boat Type, 1980-83 and Combined Years

9.3 Fatalities by Purpose of Trip

The highest percentage of fatalities by purpose of trip which involved alcohol/drug use was in the transportation category (52 percent). The other/unknown category also has a high proportion (49.9 percent). This group was probably mostly pleasure boaters and fishermen. Alcohol/drug-related fatalities comprised 34 percent of the group known to have been fishing. None of the fatalities for individuals known to have been hunting involved alcohol/drug use.

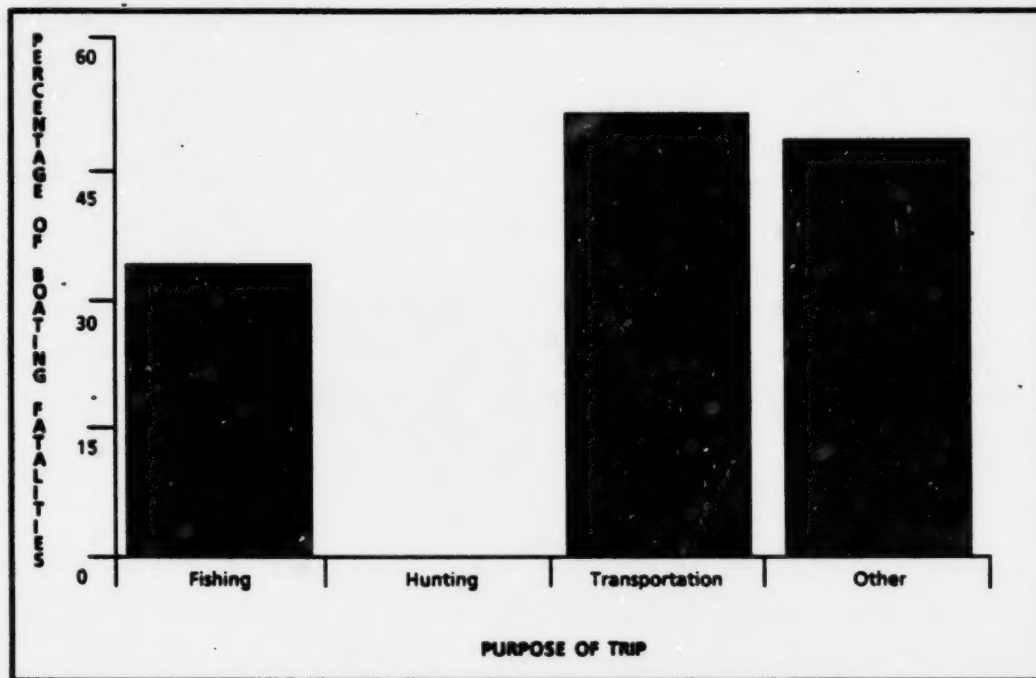


Figure 17: Percentage of Fatalities Involving Alcohol/Drugs by Purpose of Trip, and Combined Years 1980-83

Section 10: Summary

The assessment of the data in this report provides a profile of the boaters most frequently involved in fatalities. The victims are usually young males who are boating in a small vessel, are not wearing lifejackets, and are likely to have been drinking. Their entry into the water is caused either by falling overboard or by the boat capsizing. Organizations concerned with boating safety should concentrate on safety training for the operators of small boats, putting a great deal of emphasis on the role of the lifejacket/PFD in boating safety and on the consequences of alcohol/drug use while boating.

The U. S. Coastguard report *Boating Statistics 1983*, includes some evidence that boating safety courses and the Federal Boat Safety Act of 1971 have helped decrease the rate of accidents and fatalities: from 20.2/100,000 boats in 1971 to 8.1/100,000 boats in 1983.

The Office of Recreational Boating of the Ministry of Natural Resources believes that boater education could significantly reduce the number of fatalities in Ontario as well. As a result of the analysis contained in this report, it is evident that the most basic boating safety knowledge could have prevented many of the deaths.

The vast majority of the deaths (84 percent), were related to the use of small powered and non-powered boats of various kinds. Unfortunately, most operators of small boats seem to be under the impression that little or no training is required because they believe that small boats are easy to handle. Moreover, many in this group do not consider themselves boaters at all, but simply using the boat for journeying to their cottage, or for angling, hunting, picknicking and other similar activities.

Ontario has a variety of organizations that offer many excellent boating safety courses. By making the members of cottage associations, rod-and-gun clubs and other outdoor groups more aware of the need for basic boating knowledge, The Ministry of Natural Resources hopes to encourage participation in such courses. This report provides the necessary background information for the Ministry's safety awareness program.

Appendix 1: References

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Appendix 2: Data Sources

The data for this report were gathered from two of the most reliable sources available, in order to minimize the possibility of overlooking any boating-related deaths.

- 1) The Canadian Red Cross Society
Ontario Division Safety Services Branch
460 Jarvis St. 2et
Toronto, Ontario
M4Y 2H5

Files Searched: This office has yearly files on all open-water drownings in Ontario. These files consist of a collection of newspaper clippings arranged in scrapbook form. All open water drownings are included in the scrapbooks, therefore, all the articles were read to complete the survey of boating fatalities.

Note: This type of record keeping (collecting of newspaper clippings) is not a reliable, nor a complete source of information. The Red Cross data However, are useful in cross-checking with the Coroner's data.

- 2) The Office of the Chief Coroner of Ontario
26 Grenville Street
Toronto, Ontario
M7A 2G9

Files Searched: Most of the files have three useful forms: (a) coroner's reports; (b) police reports; (c) blood test results.

Note: The coroner's files are the most complete source of data. All boating fatalities should have been and are assumed to have been reported to the coroner's office. Cross-checking with the Red Cross data has uncovered some discrepancies, however, which are discussed below.

Data Discrepancies:				
Source	1980	1981	1982	1983
Red Cross	94	53	60	
Coroner	110	85	72	68
Discrepancies:				
Reports found at Red Cross but missing from the Coroner's files	15	10	6	
Reports later recovered from the Coroner's files	13	3	4	

Note: A total of 20 or 7% of the fatalities that occurred in the four years surveyed were missed upon first inspection of the Coroner's files. When names from the Red Cross files were produced, it was an easy task to recover the files since they had been placed in a different category. It is evident that though the Coroner's Office records all fatalities, it is useful to cross-check from the Red Cross files.

A supplementary appendix, *Boating Fatality Data for Ontario, 1980-83* is available on request for those individuals or organizations who wish to use the raw data for their own calculations.

APPENDIX 3: Glossary of Terms

3.1 Type of Boat

Powered boat 5.5m (18 ft.) or less:

All powered boats less than 5.5m (18 ft) in length including boats listed as motorboat where no length is specified.

Powered boat greater than 5.5m (18ft):

All powered boats greater than 5.5m (18 ft) in length, including boats listed as inboard/outboard where no length is specified.

Other boats:

Non-powered boats, such as rowboats, rafts, dinghies, peddleboats and unknowns, where no reference is made to a motor (canoes and sailboats are excluded).

3.2 Cause of Death

Hypothermia:

Hypothermia takes effect quickly when a victim is plunged into cold water, and less quickly, if the victim remains in warmer water for a prolonged period of time. The exposure to cold water lowers the body's core temperature, slowing the heart rate and decreasing the blood flow to vital organs. If victims of hypothermia are not treated quickly and effectively, they suffer cardio-respiratory failure. There are few boating accidents in which hypothermia is the sole cause of death.

Hypothermia/Drowning:

More frequent than death due to hypothermia alone, is death due to hypothermia and drowning. When victims of hypothermia lose consciousness in the water, the head submerges and they drown. Hypothermia is the primary cause of the drowning. In a number of drownings, this report assumes that hypothermia had played a role based on the surrounding circumstances.

Drowning:

Drowning is caused by asphyxiation from submersion in water. Drownings usually occur when the victims are non-swimmers or poor swimmers, weighed down by excess clothing, who panic or become

exhausted and cannot get to shore.

Injury/Drowning:

In some fatalities, drowning is preceded by a disorder other than hypothermia that contributes to victims' inability to help themselves. This category includes cases where the victims suffer a heart attack, a collision occurs, or an accident inhibits the victims' ability to keep themselves from drowning.

Injury:

In some cases the activity of boating contributes directly or indirectly to a fatality, through the victims' incursion of multiple and severe injuries and burns.

Other:

This category includes fatalities in which the cause of death is other than hypothermia, drowning or injury, and where the activity of boating contributed directly or indirectly to the fatality. For example, the victim has a heart attack from the shock of entering cold water.

3.3 Type of Accident

Capsized:

This category is used when the coroner's report states that the boat as capsized, overturned or tipped. As well, deaths in which a report does not describe the type of accident clearly, but gives some indication that the boat may have capsized, are included in this category. Boats that go over waterfalls are considered capsized.

Swamped:

A vessel inundated with water from waves, wakes or a swift current, is considered swamped. Swamping usually results in the vessel capsizing, on some occasions however, the vessel may become completely submerged. Swamping generally indicates that the vessel is overpowered or overloaded and/or that the vessel was navigating on a turbulent body of water.

Sank:

A vessel filled with water and completely submerged is considered sunken. In this report such events as the breaking apart or overloading of a vessel are the most common causes of sinking. In cases where the vessel is not recovered it is usually assumed that it sank.

Exploded:

This category includes explosions, most of which are caused by bilge fumes and occur shortly after the vessel has been refuelled.

Fell Overboard:

This category includes a variety of apparently unintentional entries by the victims into the water. The vessel usually remains upright and intact. Descriptions, such as falling in (usually caused by a loss of balance when standing) and being thrown in (usually when an overpowered boat makes a sharp turn), are included.

Collided:

This category includes vessels that struck or are struck by another object. Typical objects are other vessels or stationary objects such as piers, rocks, abutments or shoals. The collision may cause the victims to be thrown into the water, but that occurrence is considered to be secondary to the collision itself.

Fire:

This category includes cases where there is fire aboard the vessel. The cause of the fires are generally unexplained.

Dove In:

This category includes cases of intended entry by the victims, such as jumping or diving in (usually in rescue attempts).

Unknown:

Type of accident is unknown.

3.4 Factors Contributing to Fatalities

From the coroner's or police reports, the following factors are identified as having contributed to the fatalities either singly or in combination. In some cases details of the accidents are unknown and therefore, the factors contributing to the accident could not be identified.

No lifejacket or approved PFD worn or available:

Unless the report states that the victim was wearing or had access to a lifejacket/PFD (personal floatation device), it is assumed that there was none present. The use of a lifejacket or PFD does not apply to those fatalities caused solely by injuries. In these cases the use of a lifejacket or PFD would not have influenced the survival of the victim.

Lifejacket worn:

It is reported that the victim had been wearing a lifejacket or PFD.

Alcohol/Drugs:

This category includes boating fatalities where alcohol and/or drugs are known or are likely to have been consumed by the deceased.

The following sections from the Criminal Code of Canada (1982) are used as guidelines in deciding which accidents to include in this category:

Section 240(4): "Everyone who, while his ability to navigate or operate a vessel is impaired by alcohol or a drug, navigates or operates a vessel is guilty of an offence punishable on summary conviction."

Unless the coroner's report showed that the victim was legally impaired (i.e., more than .08mg of alcohol), it was difficult to judge the impairment of an individual. The individual was judged to be impaired:

- . if the individual is known to have been drinking heavily and/or abusing drugs.
- . if the individual is known, or is likely to have been drinking and/or abusing drugs, and his or her actions prior to the accident are known and are indicative of an impaired state.

. if the coroner's or police report described the victim as intoxicated.

Section 240.2 "Everyone who navigates or operates a vessel having consumed alcohol in such quantity that the proportion thereof in his blood exceeded 80 milligrams of alcohol in 100 millilitres of blood, is guilty of an offence punishable on summary conviction."

The coroner's report usually includes a blood test that measures the number of milligrams of alcohol in 100 ml of blood (written x mg%). The Centre for Forensic Sciences carries out the analysis. The alcohol level is determined by the gas chromatography method. The fatalities that do not include blood tests are those where the body is not recovered or is so decomposed as to make it impossible to achieve a reliable measurement. In cases where the body has begun to decompose, it is sometimes possible for the coroner to get a pre-death alcohol level by measuring the alcohol level present in the urine as well as the blood.

Poor Visibility:

This category involves fatalities that occurred when visibility is thought to have been hampered. Most of the cases that fall into this category involve boating at night. However, cases of fog or glare from the sun are also included.

Rough Water:

This category involves fatalities that occur when the water is turbulent. The turbulence can be caused by bad weather or sometimes by the wake of a passing boat.

Unstable:

This category involves accidents that are likely to have been caused by the deceased or by any other person standing or moving in the boat, leaning over the edge of the boat, or sitting precariously (on the gunwale, bow or transom) in the boat.

Non-Swimmer:

The fatalities in this category include individuals described by the coroner as non-swimmers.

Poor Swimmer:

Fatalities for which the coroner's report describes the deceased as a poor swimmer.

Seizure:

Fatalities that are likely to have been caused or preceded by events such as a diabetic or epileptic seizure or a heart attack.

Disrepair:

This category uses the term disrepair in a very general sense. It covers all fatalities that are either directly or indirectly caused by a boat that is unsafe because of improper maintainance. This category included leaking boats and boats that are not orderly.

Current:

This category includes all accidents that are influenced by some form of naturally flowing water including currents, rapids and waterfalls.

Overpowered Boat:

This category includes accidents involving vessels with motors that exceed the accepted horsepower capabilities for the vessel's size and structure.

Overloaded Boat:

This category includes accidents in which the total weight of persons and objects within the vessel obviously exceeded its weight capacity. Boats which were known to be overcrowded are also included in this category.

3.5 Purpose of Boating Expedition

Fishing:

Fatalities in this category are those for which fishing is specifically mentioned in the coroner's or police report, or there is substantial evidence from the circumstances surrounding the fatality that the deceased was fishing. Many of the fatalities in the other/unknown category involved victims believed to have been fishing, even though this is not specifically stated in the report.

Hunting:

This category includes persons hunting from their boat or using it for transportation while on a hunting expedition.

Transportation:

This category includes only those cases where it is specifically stated that the deceased is using the boat to reach a specific destination.

Other/Unknown:

The cases in the other category include fatalities during such activities as wild rice picking, trapping, racing and general pleasureboating. For most fatalities the purpose of the boating expedition is not evident and is therefore, included in the unknown category. It is likely that most victims were pleasure boating and/or fishing.

APPENDIX 4: Methods of Estimating Participation Rates and Occasion Rates of Recreational Boaters in Ontario

Residents

Estimates of the number of Ontario residents who participate annually in boating (powerboating, canoeing, sailing and other boating) were derived from the *Ontario Recreation Supply Inventory (ORSI)*. This survey was conducted from May 1973 to April 1974 and included only those participants over 12 years of age. For the purposes of this study, the ORSI data has been extrapolated to account for the change in the boating population from 1974 - 83 and to include participation by children under 12 years of age. The methods follow those used in Hough et al, 1979 *Volume III, Program for Recreational Harbours*. Two assumptions were applied to the ORSI data:

1. It was assumed the number of participants would increase relative to the increase in population by 1.01 percent per annum for Ontario according to Statistics Canada.
2. Although Statistics Canada estimated that 20 percent of the Canadian population is under 12 years of age, boater participation within this age group is considered to be much lower. Hough et al. (1979) estimated that 13 percent of the participants fall into that category. This results in an increase of 1.15 percent to account for participation of boaters under 12 years of age.

Table A4.1 presents the estimated annual participation in boating by Ontario residents.

Type of boat	1974 ORSI	1980	1981	1982	1983
Motorboats	2,024	2,471	2,496	2,521	2,546
Canoes	1,005	1,227	1,239	1,252	1,265
Sailboats	385	470	475	480	485
Other	634	774	782	790	798
Total	4,048	4,942	4,992	5,042	5,093

Table A4.1 Participants per Annum by Type of Boat for 1980 to 1983
(in thousands)

Note: Totals may not add, due to rounding. This applies to all tables in Appendix 4.

Estimates of the annual number of boating occasions per participant were available from the ORSI (unpublished data). The best estimates are as follows: motorboats, 10.9; canoes, 8.1; sailboats, 7.1; and other boats, 0.3. Using the estimated number of participants from Table A4.1, the total annual boating occasions was calculated; by multiplying the number of participants by the number of occasions per participant.

Type of boat	Ontario Participation	U. S. Participation
Motorboats	50	40 *
Canoes	25	28
Sailboats	10	19
Other	16	13 *

Table A4.2 Total Annual Boating Occasions by Type of Boat for 1980-83
(in thousands)

Non-residents: American Boaters in Ontario

The data required for estimating participation and occasion rates by non-residents is readily available only for American boaters. U.S. participation rates by type of boat were compiled by the University of Waterloo Leisure Studies data bank (see Hough et al., 1979). Ontario resident participation rates as compared with the U. S. as shown in Table A4.3.

Type of boat	1980	1981	1982	1983
Motorboats	26,934	27,206	27,478	27,751
Canoes	9,938	10,039	10,139	10,247
Sailboats	3,337	3,371	3,405	3,444
Other	232	235	237	239
Total	40,442	40,850	41,259	41,681

Table A4.3. Participation Rates for Ontario and U.S. Residents,
by Type of Boat

* The Waterloo Leisure Studies Data Bank compiled data for three categories only: canoes, sailboats and other boats. Other boats (53 percent) was divided into two categories (powerboats and other) relative to Ontario participation rates.

In 1982, the number of non-resident U.S. entrants to Canada by privately owned boats was estimated by Statistics Canada to be 250,293. This estimate is conservative, because it excludes the Americans and other foreigners who entered Canada by vehicle with a boat trailer or who rented boats. The U.S. population increases by approximately 1.01 percent per annum. Assuming the number of U.S. entrants increases annually relative to the growth in population, the number of U.S. participants in Ontario's recreational boating are as shown in Table A4.4.

Type of boat	Participation %	1980	1981	1982	1983
Motorboats	40	2,465	2,490	2,515	2,540
Canoes	28	1,725	1,743	1,760	1,778
Sailboat	19	1,171	1,183	1,194	1,206
Other	13	801	809	817	825
Total	100	6,162	6,224	6,287	6,351

Table A4.4 U.S. Participants Per Annum in Ontario Recreational Boating by Type of Boat for 1980 to 1982 (in thousands)

Hough et al., 1979 *Program for Recreational Harbours*, estimates the total non-resident U.S. boating occasions for 1979 to be 6,100,000. A factor of 1.01 percent per annum was applied to this figure to estimate the total non-resident boating occasions for 1980 to 1982 see Table A4.5

Type of boat	Participation %	1980	1981	1982
Motorboats	40	98,000	99,000	100,000
Canoes	28	68,000	70,000	70,000
Sailboats	19	47,000	47,000	48,000
Other	13	32,000	32,000	32,000
Total	100	245,000	248,000	250,000

Table A4.5. Non-resident U.S. Boating Occasions by Type of Boat for 1980-83
(in thousands)

Combined Resident and Non-resident Statistics

Tables A4.6 and A4.7 combine resident and non-resident data for the total number of Ontario's participants and boating occasions respectively.

Type of boat	1980	1981	1982	1983
Motorboats	29,399	29,696	29,993	30,291
Canoes	11,664	11,781	11,899	12,025
Sailboats	4,508	4,553	4,599	4,650
Other	1,033	1,044	1,054	1,064
Total	46,604	47,074	47,546	48,030

Table A4.6. Participants (including U.S. Non-Residents) in Ontario's
Recreational Boating by Type of Boat for 1980-83 (in thousands)

Type of boat	1980	1981	1982	1983
Motorboats	2,569	2,595	2,621	2,647
Canoes	1,296	1,309	1,322	1,336
Sailboats	517	522	527	533
Other	806	814	822	825
Total	5,187	5,240	5,292	5,347

Table A4.7. Boating Occasions (including U.S. Non- residents) in Ontario by Type of Boat for 1980-83 (in thousands)

1984 BOATING FATALITIES EXECUTIVE SUMMARY

In a continuing study into Boating Fatalities in Ontario, by the Ontario Ministry of Natural Resources' Office of Recreational Boating, it was revealed that the number of deaths in 1984 increased to 92 over 1983's reported figure of 68.

The following is a table which highlights the 1984 study showing a comparison with reported percentages for 1983 and overall 1980-1983. The groupings listed were specifically chosen as they represent those areas which reported the highest percentages and/or significant increases for 1984.

Highlights of Boating Fatality percentages covering 1983, 1984, and combined 1980-1983

GROUP	1983	1984	1980/83
1. BOAT TYPE			
Power Boat < 5.5m	39.71	50.00	44.85
Canoes	26.47	22.37	28.69
2. MONTH			
MAY	14.71	20.65	15.60
NOVEMBER	2.94	6.52	3.62
3. AGE			
20 - 24	13.24	15.22	15.32
25 - 29	22.06	11.96	13.93
4. CAUSE OF DEATH			
Drowning	80.88	60.87	69.64
Drowning/Hypothermia	7.35	28.26	16.16
5. TYPE OF ACCIDENT			
Capsized	33.82	26.67	37.60
Fell Overboard	23.53	25.33	27.30
6. CONTRIBUTING FACTORS			
No Life Jacket/PFD	85.29	53.26	76.47
Alcohol/Drugs	45.59	36.96	58.82
7. PURPOSE OF TRIP			
Other(Unknown)	41.18	44.00	32.87
Fishing	42.65	41.33	55.99

1. TYPE OF BOAT

The 1984 percentage increase for powered boats less than 5.5m (18 ft.) is the major area where most of the additional deaths occurred.

2. MONTH

Although the summer months, June - September, maintained fairly high averages in 1984, as it did in the years 1980-83, the additional deaths were found to have occurred in the months of May and November. May reported the highest percentage amongst all months, while November showed a significant percentage increase.

3. AGE

The increase in deaths, for 1984, were basically spread out amongst all age groups. The age range of 20 - 29 still accounted for the highest percentage of deaths.

4. CAUSE OF DEATH

The drop shown in the 1984 percentage of drowning deaths can be attributed to better classification of the cause of death. The increase in the percentage of deaths caused by drowning due to hypothermia can be credited not only to better classification of drowning victims, but also to the increase in the number of deaths occurring in the cold water months of May and November.

5. TYPE OF ACCIDENT

The additional types of accidents for 1984 were spread out amongst all categories with capsizing and falling overboard still leading the way as the major two.

6. CONTRIBUTING FACTOR

The increase in the number of deaths for 1984 were also spread out amongst all categories. Of the 36.96% alcohol related deaths, 74.36% of them were illegally impaired.

7. PURPOSE OF TRIP

No significant change was found in this group except for the category of unknown (other).

1984 OVERVIEW

Most deaths were found to occur to young people riding in powered boats less than 5.5m for the purpose of fishing or reasons unknown (other). Most deaths were caused by drowning with a significant increase in the number of deaths that were caused by drowning due to hypothermia. Capsizing and falling overboard were the major reasons behind the accidents. Contributing factors in the deaths were related to no life jackets being worn and the influence of alcohol/drugs. Most deaths occurred in the month of May, with November showing an increase.

August 21, 1985